

Job Jolt The Economic Impacts of Repowering the Midwest:
The Clean Energy Development Plan for the Heartland



An Economic Study by the Regional Economics Applications Laboratory for the Environmental Law & Policy Center

> »Citizens Action Coalition of Indiana »Dakota Resource Council »Iowa RENEW »Izaak Walton League of America »Minnesotans for an Energy-Efficient Economy »RENEW Wisconsin »Union of Concerned Scientists

# Job Jolt

The Economic Impacts of Repowering the Midwest:

The Clean Energy Development Plan for the Heartland
... with clean, renewable and efficient energy

# **Executive Summary**

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Regional Economics Applications Laboratory for the Environmental Law and Policy Center

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# **Introduction** | Overview: Clean Energy = More Good Jobs

Implementing the Repowering the Midwest Clean Energy Development Plan would create more than **200,000** new jobs across the 10-state Midwest region by 2020, up to **\$5.5 billion** in additional worker income, and up to **\$20 billion** in increased economic activity.

Repowering the Midwest's Clean Energy Development Plan promotes modern, energy efficient technologies and development of renewable energy resources, especially wind power and biomass energy. This plan contrasts with a business-as-usual scenario, which relies almost entirely on polluting coal and nuclear power plants for electricty generation.

This huge resulting Job Jolt is the central finding of a comprehensive study of the economic impacts of phasing in more clean energy efficient technologies and renewable energy development across the

Midwest and Great Plains. The
Regional Economics Applications
Laboratory (REAL), a nationally
renowned research center of the
University of Illinois, used its
modeling techniques to determine
the economic impacts of implementing
the clean energy development plan
proposed by the Environmental Law
& Policy Center (ELPC) and its
Midwest partners.

Repowering the Midwest: The Clean
Energy Development Plan for the Heartland is a blueprint for producing economically and environmentally sound power by unleashing the Midwest's homegrown clean energy potential. It calls for a gradual reduction of overreliance on some of the Midwest's oldest and most polluting coal and nuclear generating plants that currently account for 95 percent of the region's electricity generation — and for a gradual

increase in using modern clean energy technologies.

To achieve this, the Clean Energy Development Plan calls for:

energy efficiency technologies to level off the region's overall electricity demand. These energy efficiency technologies, ranging from efficient lighting and ballasts to Energy Star® appliances to state-of-the-art industrial motors, can save business and residential consumers money. On average, these new technologies cost 2.3¢ per kilowatthour, or less, which is below the cost of generating, transmitting and distributing electricity from coal, gas or nuclear plants.

[2] Diversifying the region's overdependence on coal and nuclear plants by developing more renewable energy generating technologies: wind and solar power, and biomass energy locked inside agricultural crops, such as switchgrass and cornhusks. The environmental and public health advantages of this conversion are evident. Pollutants from coal plants are major contributors to smog, acid rain and global warming. Nuclear plants produce highly radioactive wastes and impose extraordinary costs for storage and disposal. However, these old technologies continue to hold a near-monopoly over the Midwest power market. Why?



# Environmental Law & Policy Center

One reason is the widespread myth that developing clean energy resources would be too expensive and cost jobs.

REAL finds that nearly the opposite is true. A partial switch to cleaner, smarter energy—as detailed in Repowering the Midwest—would energize the Midwest economy with hundreds of thousands of new jobs and billions of dollars in new income and economic activity.

The magnitude of these job and dollar gains is enormous. New jobs resulting from implementing the Clean Energy Development Plan would be more than twice the total employment in the Midwest electric utility industry.

The economic impacts from implementing the Clean Energy Development Plan would be distributed throughout the Midwest and Great Plains in both metropolitan and rural areas, and in every sector of the regional economy from manufacturing to construction to farming.

### For example:

- Jobs manufacturing and installing modern commercial lighting and efficient ballasts, and Energy Star®rated appliances.
- Jobs manufacturing and assembling wind turbines and solar panels.
- New sources of farm income from wind turbine leases and growing and processing biomass energy crops.

This job gain and economic growth greatly outweigh the projected loss of jobs and income in the electric utility industry caused by reducing demand for power from coal and nuclear plants.



A partial switch to cleaner, smart energy efficiency and renewable energy would energize the Midwest economy with hundreds of thousands of new jobs...



### SUMMARY OF REGIONWIDE ECONOMIC IMPACTS OF REPOWERING THE MIDWEST

Clean Energy	Net Job Growth		Increased Annual Economic Output	
	2010	2020	2010	2020
Energy Efficiency	83,900	140,900	\$7.1 Billion	\$12.7 Billion
Renewable Energy	36,800	68,400	\$3.7 Billion	\$6.7 Billion
Total	120,700	209,300	\$10.8 Billion	\$19.4 Billion

Source: Regional Economics Applications Laboratory

# Reasonable Assumptions | Achievable Vision: The Midwest Clean Energy Development Plan

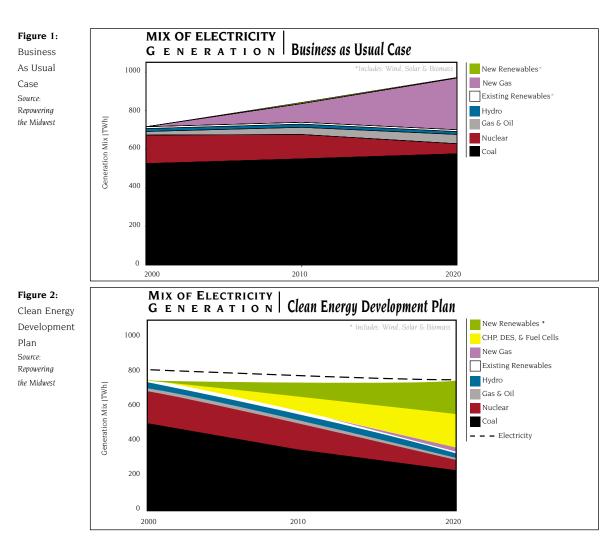
Repowering the Midwest calls on both the public and private sectors to embark on a 20-year phase-in of more energy efficient technologies and renewable energy resources. Implementation strategies include Energy Efficiency Investment Funds created in each state, energy efficiency building codes, and renewable portfolio standards that require electric utilities make renewable energy a reasonable share of their power supply that is delivered to consumers.

Central to the report are the two ambitious and achievable

implementation targets specified by Repowering the Midwest's Clean Energy Development Plan:

# [1] Energy Efficiency. By 2010, electricity consumers in all sectors—industrial, commercial and residential—would improve efficiency and reduce power demand by 17 percent below the projected business - as - usual rate of consumption. By 2020, the difference would be a 28 percent reduction. These reductions would be more than enough to achieve a flattening-out of Midwest electricity demand at current levels.

[2] Clean Renewable Energy Development. By 2010, electric utilities would supply a more diverse fuel mix to consumers in which **8 percent** of electricity is generated by cleaner renewable energy technologies including wind power, biomass energy, and solar power. By 2020, this clean renewable energy would increase to 22 percent of electricity supplied to consumers. Moreover, developing and implementing efficient natural gas uses in appropriate locations, especially Combined Heat and Power (CHP), district energy systems and fuel cells,



would boost the cleaner energy component of the electricity supply to 18 percent by 2010 and to 46 percent by 2020.

The environmental and health benefits of phasing out some of the oldest, most polluting coal plants alone would justify the Clean Energy Development Plan.

Compared to a business-as-usual future (95 percent coal and nuclear), the reasonable shift outlined in Repowering the Midwest would reduce:

- Acid rain-causing sulfur dioxide emissions (SO<sub>2</sub>) by 56 percent.
- Smog-causing nitrogen oxide emissions (NOx) by 71 percent.
- Global warming-causing carbon dioxide emissions (CO<sub>2</sub>) by 51 percent.
- Emissions of particulates, mercury and other heavy metals.

These pollution reductions would lead to a significant reduction in asthma, respiratory ailments and other public health problems. The catastrophic risks of a nuclear power plant accident and the volume of radioactive nuclear wastes would also be reduced as some older nuclear plants are retired.

Another benefit would be better electricity reliability. Increased energy efficiency will ease the strain on transmission and distribution systems.

But what of the economic impacts? Would the expense of this clean energy transition punch a hole in family budgets and crimp the competitiveness of Midwest businesses? What about jobs, especially if some of the older coal plants are retired? To get answers, ELPC and its Midwest partners asked REAL to run the numbers.



By 2020, clean renewable energy would increase to 22 percent of electricity supplied to consumers in the Midwest and Great Plains.



# Empirical Method | Emphatic Result: REAL Models The Repowering the Midwest Clean Energy Development Plan

The economic impacts of implementing the Clean Energy Development Plan were estimated using regional econometric input-output models developed by REAL to forecast the local impacts of changing economic conditions and policies. Since 1989, REAL has developed, and continually refined, a portfolio of models covering metropolitan regions and states across the Midwest. Using primarily U.S. Census data, REAL's dynamic models track employment, income and output data across 53 industrial sectors, factoring in 13 demand variables (consumption, investment, government expenditures, etc.) and eight demographic variables (age, sex, migration, etc). Previous REAL studies have examined a broad range of economic phenomena, from the Impact of the Monet Exhibition at the Art Institute of Chicago to the Impact of Electricity Deregulation on the Chicago Economy. To evaluate the Repowering the Midwest impacts, REAL conducted two discrete studies involving 10 individual states: Illinois, Indiana, Iowa, Michigan, Minnesota, Nebraska, North Dakota,

Ohio, South Dakota and Wisconsin.
The two studies evaluated the key components of the Clean Energy
Development Plan put forward in
Repowering the Midwest:

- Energy Efficiency Impacts for the Midwest measures the changes in employment, income and economic output that would result from investments in energy efficiency that save up to 17 percent of electricity use by 2010 (versus business-as-usual) and 28 percent by 2020.
- Renewable Energy Impacts for the Midwest measures the changes in employment, income and economic output that would result from a program of clean energy development (wind, solar, biomass) in which 8 percent of Midwest electricity would be generated from renewable energy by 2010 and 22 percent by 2020.

  And, with efficient natural gas uses, 18% by 2010 and 46% by 2020.

A summary of the combined impacts of achieving these two goals is provided in Figure 4.

# **Energy Efficiency Implementation Impacts**

The results of REAL's study indicate that the energy efficiency measures outlined in Repowering the Midwest's Clean Energy Development Plan will generate as many as 84,000 jobs by 2010 (over and above a business-asusual baseline) rising to 141,000 jobs by 2020. These jobs will generate local income—direct and indirect—of up to \$1.8 billion by 2010 rising to \$3.2 billion in the year 2020. The plan will increase Midwest economic output by as much as \$7.1 billion by 2010 rising to \$12.7 billion by 2020.

Many of the largest beneficiaries of a conversion to energy efficiency are manufacturers already located in the Midwest. More workers will be needed, for example, to make triple-glazed windows for Andersen Windows, smart thermostats for Honeywell and Johnson Controls, energy efficient lighting equipment for Osram Sylvania, and Energy Star® appliances for Whirlpool.

Total	120,700	209,300	\$10.8 Billion	\$19.4 Billion
Renewable Energy	36,800	68,400	\$3.7 Billion	\$6.7 Billion
Energy Efficiency	83,900	140,900	\$7.1 Billion	\$12.7 Billion
	2010	2020	2010	2020
Clean Energy	Net Job Growth		Increased Annual Economic Output	

**Figure 4:** Summary of Region-wide Economic Impacts of Repowering the Midwest Source: Regional Economics Applications Laboratory

# **Venture Lighting Solon, Ohio**

Venture Lighting, a division of
Advanced Lighting Technologies,
is a leading developer and
manufacturer of energy efficient
metal halide lighting systems.

Metal halide can replace fluorescent
tubes in indoor applications and
sodium vapor in outdoor ones. It
reduces energy consumption, reduces
maintenance and improves the quality
of lighting. The company employs 295
people at its Solon, Ohio facility.

Each state in the region has different manufacturing capabilities and, thus, different economic impacts from implementing the energy efficiency plan. Highly industrialized states such as Illinois, Indiana, Michigan and Ohio achieve the most substantial job gains from increased use of clean energy efficiency technologies. The REAL model incorporates these variables to compute the average state-by-state impacts described in Figure 5.

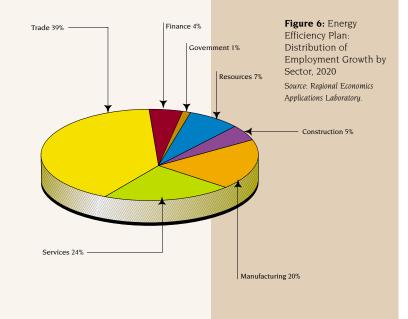
Energy efficiency installations will create new jobs in nearly all economic sectors — the largest gains are in trade (39 percent), professional and personal services (24 percent) and manufacturing (20 percent), as shown in Figure 6. These gains are partially eroded by a loss of jobs in the utility sector as demand for electricity flattens out.



Highly industrialized states such as Illinois, Indiana, Michigan and Ohio achieve the most substantial job gains from increased use of clean energy efficiency technologies.

	Energy Eff	iciency Im	pacts		
State	Net New En	Net New Employment		Increased Annual Economic Output	
	2010	2020	2010	2020	
IL	26,000	43,400	\$2.6 Billion	\$4.6 Billion	
IN	8,800	15,500	\$7 Billion	\$1.2 Billion	
IA	3,700	6,800	\$200 Million	\$300 Million	
MI	16,100	29,100	\$1.3 Billion	\$2.4 Billion	
MN	4,000	8,200	\$200 Million	\$400 Million	
NE	1,500	2,900	0	\$100 Million	
ND	400	900	0	0	
ОН	18,900	25,500	\$2 Billion	\$3.4 Billion	
SD	600	1,200	0	0	
WI	3,900	7,400	\$100 Million	\$2.7 Billion	
Total Region	83,900	140,900	\$7.1 Billion	\$12.7Billion	

**Figure 5:** Energy Efficiency: Summary of Economic Impacts by State Source: Regional Economics Applications Laboratory. Represents Impacts of Clean Energy Development Plan versus the Business-As-Usual baseline projections for Employment and Economic Growth.



# **Empirical Method** | **Emphatic Result** cont.

# **Renewable Energy Development Impacts**

REAL's study shows that implementing the renewable energy component of the Clean Energy Development Plan in Repowering the Midwest will generate 25,000 - 41,000 new jobs by 2010, and 58,000 - 74,000 jobs by 2020. These jobs will generate local income of \$700 million -\$1.3 billion in 2010, rising to \$1.7 billion - \$2.3 billion in 2020. Implementation also will increase annual Midwest economic output by \$2.3 billion - \$4.0 billion in 2010, and by \$5.5 billion - \$7.3 billion in 2020 as described in Figure 7.

Because business - as - usual electricity generation in the Midwest is predominantly dependent on imported fuels—such as western coal transported by rail car from Wyoming—its partial

replacement will not produce significant job losses in the Midwest. Renewable energy will create new jobs—both directly and indirectly in all major economic sectors. As shown in Figure 8, by 2020, the manufacturing sector will account for 17 percent of the job gains, construction for 15 percent, services for 33 percent, and agriculture for 12 percent. Many of these jobs and economic gains will be located in rural areas where they will provide a valuable boost to local economies.

Companies benefiting from increased investment in renewable energy will include small-but-growing businesses such as Energy Maintenance Service, Inc.— see company profile on page 9 which installs and maintains wind power equipment across the Midwest from its new facility in Howard, South

Dakota. This facility has delivered a tonic to a town that lost 13 percent of its population during the 1990s. What's more, every time an Energy Maintenance Service repair crew eats at a restaurant or sleeps at a motel, or the company purchases a new truck or tool, some local Midwest business benefits, eventually enough to hire more help.

Construction and operation of wind power machines will account for 28 percent of the new jobs and biomass energy for 17 percent of the new jobs by 2020. As Figure 9 shows, a large number of jobs are also created by increasing the efficiency of new environmentally preferable uses of natural gas. New clean burning Combined Heat and Power (CHP) installations will create fully 27 percent of the new jobs, and district

		Renewable Energy	Impacts	
State	Net New Employment		Increased Annual Economic Output	
	2010	2020	2010	2020
IL	8,700	13,500	\$1 Billion	\$1.5 Billion
IN	3,500	6,500	\$300 Million	\$600 Million
IA	2,400	5,700	\$300 Million	\$600 Million
MI	4,100	9,100	\$400 Million	\$1 Billion
MN	3,900	6,400	\$400 Million	\$700 Million
NE	1,500	2,600	\$200 Million	\$300 Million
ND	1,000	2,100	\$100 Million	\$200 Million
ОН	7,200	13,500	\$600 Million	\$1 Billion
SD	1,300	2,600	\$100 Million	\$200 Million
WI	3,200	6,400	\$300 Million	\$600 Million
Total Region	36,800	68,400	\$3.7 Billion	\$6.7 Billion

Figure 7: Renewable/Clean Energy: Summary of Economic Impacts by State

# Environmental Law & Policy Center

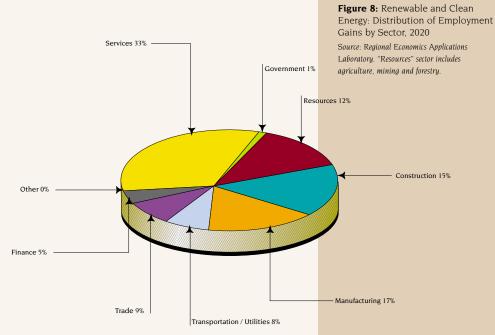
# **Energy Maintenance Service, Inc. Gary, South Dakota**

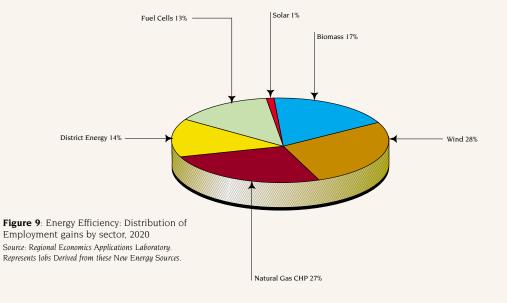
Founded in 1998 by renewable energy entrepreneur Joe Kolbach, Energy Maintenance Service employs 35 people installing and maintaining wind turbines of all sizes and types, for both commercial and residential customers throughout the country. The company has benefited from state and federal incentives as well as renewable portfolio standard policies which have created a positive climate for wind power development.

Though headquartered in South Dakota, the company's crews are constantly on the road throughout North America. Every day the crews spend in the field, they are benefiting local economies through spending on motels, food and supplies.

energy systems — where a group of buildings is served by a single boiler/ generator — will deliver 14 percent. This cleaner modern CHP will mostly displace power that would otherwise be generated by more polluting coal plants. State-by-state breakouts for jobs and economic output are presented in Figure 7 on page 8.







Implementing the renewable energy development plan will generate 25,000 - 41,000 new jobs by 2010 and 58,000 - 74,000 new jobs by 2020.

# **Conclusion: It's Time to Act**

The Midwest needs a strategic clean energy development plan that implements smart policies and practices to capture readily achievable environmental, public health, employment and economic growth benefits. The Environmental Law & Policy Center and its Midwestern partners set forth a detailed plan to accomplish this goal in Repowering the Midwest:The Clean Energy Development Plan for the Heartland. (www.repowermidwest.org)

energy efficiency and renewable energy technologies would produce a Job Jolt of more than **200,000** new jobs, **\$5.5 billion** in new household income and close to **\$20 billion** in additional annual economic output by 2020.

changed and greatly improved in virtually every other sector of modern life?

Polls consistently show that Midwesterners are ready to seize the opportunities offered by energy efficiency and renewable energy

The Midwest needs a strategic clean energy development plan that implements smart policies and practices to capture readily achievable benefits.



The environmental quality and public health benefits of Repowering the Midwest have never been seriously disputed.

This analysis by REAL substantiates the job gains and economic benefits of putting the Clean Energy Development Plan in Repowering the Midwest into action.

Rather than impose an economic burden, the phase-in of more clean

The energy choices facing the Midwest have never been more clear. Should the region stay chained to its overreliance on aging coal and nuclear power plants, many of them built in the 1950s, 1960s and 1970s, now past their intended lives? Or is it time to diversify our energy portfolio with clean, 21st Century technologies — as technologies have profoundly

technologies and systems. It is now time—past time, really—for public and private sector leaders to stand up and lead.

Our region's Congressional delegation must lead by insisting upon strong energy efficiency and renewable energy development provisions in energy, agriculture and transportation legislation.

State lawmakers must lead by enacting clean energy development policies, investments and incentives, beginning with "Renewable Portfolio Standards" that require all electric utilities to include a specified percentage of clean renewable energy in the mix of electricity that they supply to consumers.

Strong energy efficiency building codes should be adopted and implemented so that new commercial and residential buildings are constructed to achieve both long-term energy cost savings and pollution reduction benefits.



States should also create Energy Efficiency Investment Funds and Renewable Energy Investment Funds as described in the Repowering the Midwest plan. These Funds should be managed by independent and highly capable third-party administrators and overseen by boards that include environmental and consumer representatives.

Governors and their appointed regulators must lead by leveling the electricity playing field so that clean, renewable power can move through the transmission system under fair terms. Electric utilities and other businesses that own and operate transmission lines must not be allowed to discriminate against renewable energy, or impose transmission rate penalties on wind and solar power generation.

County, municipal and school officials must lead by strengthening their building codes and implementing more energy efficiency technologies. Public buildings should be models of energy efficiency both to save money and to reduce air pollution.

Decision-makers at all levels should recognize that increased energy efficiency and clean renewable energy development mean more new jobs and economic gains. There is no trade-off between the environmental and public health benefits from clean energy development and the economic impacts. That is a myth. It is a win-win for the environment and the economy.

Midwestern citizens need to lead as well. We all should understand and recognize that the opportunity for clean energy development is about our clean air and clean water, our healthy lungs, our pocketbooks and our future. In some matters — fashion, entertainment and social mores — the Midwest is said to follow the Coasts. On this matter — our nation's energy future — the bountiful and sensible Midwest region is in a unique position to get out front and lead.

It is time to act. It is time to Repower the Midwest.



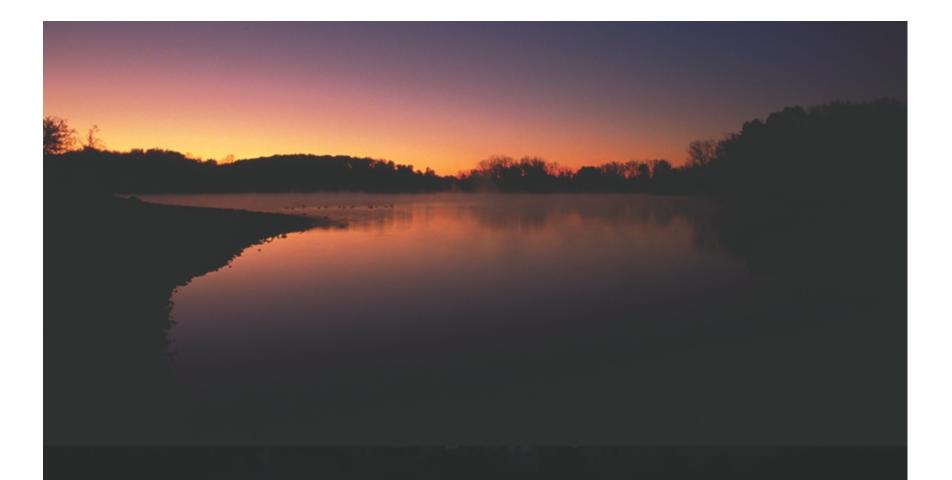
There is no trade-off between the environmental and public health gains from clean energy development and the economic impacts. That is a myth. It is a win-win for the environment and the economy.

# Repowering the Midwest: The Clean Energy Development Plan for the Heartland

Repowering the Midwest, released in February 2001, presents the opportunity for the Midwest to develop its homegrown clean energy efficiency technologies and renewable wind, biomass, and solar power resources. The Clean Energy Development Plan achieves large environmental, public health and economic development benefits. Investing in energy efficiency and renewable energy will also diversify the region's electricity portfolio, thereby improving reliability.

To read more about Repowering the Midwest, please look at **www.repowermidwest.org** or call ELPC at **312-673-6500** to request a copy of the report.





### **Regional Economics Applications Laboratory**

The Regional Economics Applications Laboratory (REAL) was formed in 1989 to provide analytical capability to a range of policy and decision makers in the Midwest through the construction and application of economic models of urban, metropolitan and state economies. REAL maintains offices in both Chicago and Urbana. Applications have ranged from impacts of cultural events to implications of gas and steel price increases and, more recently, the role and impact of international trade on interstate trade among the Midwestern state economies.

While the initial focus remains on the Midwest, REAL has constructed models for regional economies in Japan, Indonesia, Korea, Columbia, Chile and Brazil. Personnel are drawn from a diverse set of disciplines, including agricultural economics, economics, geography and urban and regional planning. Many of these researchers are from countries outside North America.

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### **Environmental Law & Policy Center**

The Environmental Law & Policy Center (ELPC) is the Midwest's leading environmental legal advocacy and eco-business innovation organization. We develop and lead strategic advocacy campaigns to protect natural resources and improve environmental quality. We are public interest entrepreneurs who engage in creative business dealmaking that puts into practice our belief that environmental progress and economic development can be achieved together.

ELPC's strategic approach involves proposing positive solutions when we oppose threats to the Midwest environment. We say "yes" to better solutions; we don't just say "no."

### ELPC works to:

- 1. Promote sustainable energy strategies by developing energy efficiency and renewable energy resources to reduce pollution from coal and nuclear plants that harms our environment and public health;
- 2. Design and implement smart growth planning solutions to combat sprawl and innovative transportation approaches, such as the development of a Midwest high-speed rail network, that will lead to cleaner air and more jobs; and
- 3. Advocate sound environmental management practices that preserve natural resources and improve the quality of life in our communities.

REAL and ELPC appreciate the generous financial support provided by the Joyce Foundation to REAL for the economic analysis and related work to produce Job Jolt, and by the Energy Foundation, the Leighty Foundation and the McKnight Foundation to ELPC for its extensive work on Job Jolt.